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TITLE: Computer-aided diagnosis  
system for medical use

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INVENTOR-INFORMATION:

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ABSTRACT:

A picture archiving communication system for  
storing, transferring various  
digital image data in a single or a plurality of  
hospitals includes a modality,

storing, transferring various digital image data in a single or a plurality of hospitals includes a modality, a data base, a workstation as a display unit, and a network for connecting these components. The modality includes various diagnosis apparatuses for generating medical digital images, such as a film digitizer, an angiography apparatus, a CT **scanner**, an MRI system, a nuclear medicine diagnosis apparatus, an ultrasound diagnosis apparatus, and an electric endoscope. An examination ordering system is connected to the network. The workstation outputs

**computer-aided diagnosis** data obtained by analyzing medical image data by means of a computer. This **computer-aided diagnosis** data includes the location, the type, and the degree of abnormality. In order to alarm an abnormality, the workstation displays a marker pointing the portion of the abnormal portion on the image, a text sentence representing the details of the abnormality. The

**computer-aided diagnosis** data is obtained before its output is requested. The

**computer-aided diagnosis** data is stored in a semiconductor memory until its output is requested.

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57 Claims, 54 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 33

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Abstract Text - ABTX (1):

A picture archiving communication system for

instructions from an operator.  
The display screen displays miniature images of the films having color-coded borders so that the operator monitors the processing of the films. The interface also includes a bar code reader and allow the operator to conduct procedures for testing the scanner.

33 Claims, 9 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 8

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Abstract Text - ABTX (1):

A user interface for facilitating the input of films into a computer-aided diagnosis system is disclosed. The user interface includes a scanner which receives and scans the film-based images, and a film feeder which holds and transports them to the scanner. A touch sensitive display screen is provided to display status information to and receive instructions from an operator. The display screen displays miniature images of the films having color-coded borders so that the operator monitors the processing of the films. The interface also includes a bar code reader and allow the operator to conduct procedures for testing the scanner.

Brief Summary Text - BSTX (10):

Accordingly, the present invention is directed to a user interface for facilitating input of data from medical images into a computer-aided diagnosis system for detecting anatomical abnormalities in the medical images. The user interface receives image data from a source such as a digital medical imaging system, digital image storage system, or a scanner which receives and scans the film-based medical images and generates the digital image data. According to a preferred embodiment, a film feeder is mechanically connected to the scanner and holds one or more film-based medical images. The film feeder also transports the film-based medical images to the scanner. A display is coupled with the computer-aided diagnosis system and displays status information to a user who loads the film-based medical images in the film feeder. The user interface also includes a system by which the user can enter information into the computer-aided diagnosis system.

Brief Summary Text - BSTX (11):

According to a preferred embodiment of the invention, the user interface also displays status information which indicates when the scanned film-based medical image was incorrectly loaded into the film feeder. The film feeder may be of a slotted type, stack feeding type, or some other type. Additionally, the user is able to instruct the computer-aided diagnosis system to organize the digital image data to compensate for errors in loading the film feeder.

Brief Summary Text - BSTX (13):

According to a further preferred embodiment, a touch-sensitive panel is overlaid on a display screen. By using the touch-sensitive panel, the user indicates to the computer-aided diagnosis system which image views will be loaded into the film feeder. The touch-sensitive panel is also used to control other CAD system functions such as selection of user options, self-test, diagnostics, quality control and assurance procedures, system maintenance functions, error reporting, and data archiving. The touch-sensitive panel or a keyboard may be used to enter patient information. A bar code reader may be provided to scan bar coded information identifying the film-based medical images and may access patient information from a database of the institution operating the computer-aided diagnosis system. The touch-sensitive panel and the bar code reader may also be used to give commands to the system in the absence of a keyboard. Quality assurance procedures are also provided to allow the user to test the scanner.

Detailed Description Text - DETX (19):

Additionally, certain medical images may already be in digital format, such as images that were acquired with a digital medical imaging system, or that are stored in a digital image storage system. According to the invention, an example of a computer-aided diagnosis system which

receives images already in digital format is shown in FIG. 4. Although processor housing 102 is shown connected to both digital image storage system 144 and digital medical imaging system 146, in general only one source of digital image data is needed. A wide variety of digital medical imaging systems currently exist. Some examples are: computer tomography systems, digital ultrasound imaging systems, scintillation camera systems, digital stimulated emission phosphor plate radiography systems, nuclear magnetic imaging systems, and digital mammographic systems. An example of a digital image storage system is disclosed in U.S. Pat. No. 5,416,602 to Inga et al., entitled "Medical Image System With Progressive Resolution" incorporated herein by reference. In the case where medical images are already in digital format, the feeding and scanning functions of the system are not needed. In such cases, the operator monitors the digital data being received by the system using the display panel, and is able to re-orient or change the order of images electronically, as will be described in greater detail below.

Claims Text - CLTX (2):

a scanner adapted to receive and scan the film-based medical images and generate therefrom digital image data, the digital image data representing the medical images and characterized by high spatial resolution, said scanner communicating with the computer-aided diagnosis system and adapted to transmit

the digital image data to the computer-aided diagnosis system for analysis by the computer-aided diagnosis system;

Claims Text - CLTX (4):

a display in communication with the computer-aided diagnosis system and said scanner, said display adapted and configured to display status information to a user who loads film-based medical images into said feeder and monitors input of the data into the computer-aided diagnosis system, wherein upon completion of scanning of a first film-based medical image the status information is displayed to the user such that the user can detect errors in loading the first film-based medical image into said feeder and such that the user can take any necessary corrective action; and

Claims Text - CLTX (5):

a user input system in communication with the computer-aided diagnosis system and said scanner, said user input system adapted and configured to receive input information from the user.

Claims Text - CLTX (26):

a scanner adapted to receive and individually scan the film-based medical images and generate therefrom digital image data which can be analyzed by the computer-aided diagnosis system;

Claims Text - CLTX (28):



a display screen in communication with the  
computer-aided diagnosis system  
and said scanner;

Claims Text - CLTX (30):

a touch-sensitive panel overlaying said display  
screen in communication with  
the computer-aided diagnosis system and said  
scanner, the touch-sensitive panel  
positioned and configured to receive input  
information from a user.